

THE SUSCEPTIBILITY OF THE INDIVIDUAL TO THE BITES OF *STEGOMYIA CALOPUS*

BY

R. M. GORDON

*From the Research Laboratory, Liverpool School of Tropical
Medicine, Manaus, Brazil*

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The usual belief amongst Europeans residing in the Tropics, with regard to the susceptibility of the individual to the biting of mosquitoes, would appear to be that the new-comer receives proportionately more bites than the old resident, but that the native of the country receives less than either.

Marchoux, Salimbeni and Simond (1903), writing of *Stegomyia calopus*, state ' . . . Il a une prédilection marquée pour la race blanche.' And later in the same article, ' Il s'attaque beaucoup plus avidement aux individus jeunes, vigoureux, qui ont la peau fine et le teint coloré, qu'aux individus anémiés ou âgés.'

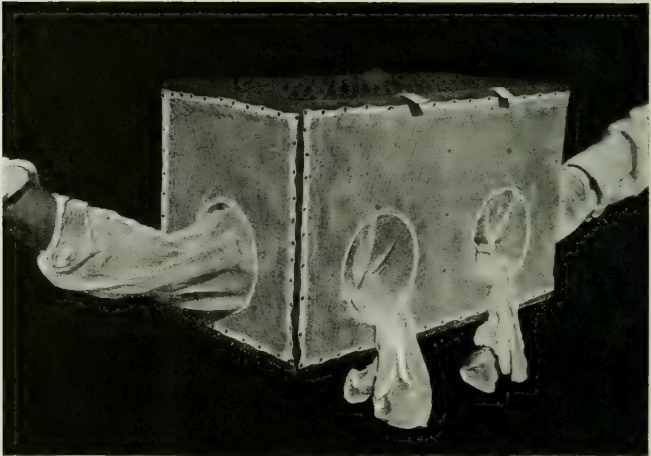
It appeared of interest to test the truth of this idea and, at the same time, to investigate the following points with regard to their influence on the biting of mosquitoes: (1) Sweating; (2) hairiness of skin exposed to bites; (3) colouration; (4) age. Attention was also paid to the subsequent local reaction to the bites.

Nature of Experiment. All experiments were performed with *Stegomyia calopus*, owing to its being a day-feeder and the commonest mosquito in the locality.

Sixteen experiments were performed, at each of which a number of male persons, usually six, of various nationalities and different lengths of residence in Brazil, were exposed, under the same conditions, to the bites of a number (usually forty-five to fifty) of

hungry *Stegomyia calopus* females. The number of completed feeds performed on each individual during 30 minutes were noted.

Apparatus used and Method of Recording Results. The feeding-box consisted of a large mosquito cage measuring 24 by 15 by 12½ inches, and fitted with six sleeves. All experiments were performed in daylight at approximately the same hour, and the box placed in such a position that it was as far as possible evenly illuminated.



Mosquito cage used for the experiment. In practice, the sleeve was fitted closely to the forearm, at its junction with the cage wall.

Forty to fifty female mosquitoes, which had been kept unfed for at least four days since their date of emergence, were released in the cage. The individuals to be tested then introduced one of their hands through the sleeves so that each had the same amount of forearm and hand exposed to bites.

It was found in practice that the female *Stegomyia*, unless disturbed, never bit twice, and counts could be made easily and accurately.

After the first two experiments it was noted that mosquitoes that bit on the under surface of the wrist and hand were hard to count, and, at Dr. H. Wolferstan Thomas's suggestion, in all subsequent experiments, cardboard shields were used to protect this surface.

An example of an experiment is given to show the data recorded.

EXPERIMENT 3. Date: 3.10.21. Number: *Stegomyia calopus*
= 50.

Name	Age	Colouration	Hairiness of exposed arm	Nationality	Number of years in Brazil	Residence in other countries with service in each	Sweating : first 15 mins.	Sweating : second 15 mins.	Number of bites received
O.K. ...	30	Dark	o	British	9	England only	+	+	8
M.L. ...	35	Dark	o	Portuguese	16	Portugal 20 years	+	+	13
B.E. ...	25	Fair	o	British	2	England and Canada only	o	+	7
M.S. ...	20	Dark	o	Brazilian	18	Nil	o	o	8
T.S. ...	47	Fair	+	Canadian	15	England and Canada only	o	+	3
L.O. ...	23	Dark	+	Brazilian	23	Nil	+	+	9

RESULTS.

I. Length of Residence.

	Total number of individuals tested	Total number of bites received	Average number of bites received by each individual
Persons above 5 years' but under 30 years' residence in Brazil. (Majority 10-15 years)	62	462	7.4
Persons under 2 years' residence in Brazil. (Majority under 1 year, some a few weeks)	26	157	6.0

II. Sweating.

	Total number of individuals tested	Total number of bites received	Average number of bites received by each individual
Persons sweating on the exposed forearm and hand ...	30	212	7.0
Persons not sweating on the exposed forearm and hand.	58	407	7.0

III. Hairiness.

	Total number of individuals tested	Total number of bites received	Average number of bites received by each individual
Persons showing a considerable amount of 'hairiness' on the exposed forearm and hand	40	286	7.1
Persons not showing any marked 'hairiness' of exposed forearm and hand	48	333	6.9

IV. Colouration.

	Total number of individuals tested	Total number of bites received	Average number of bites received by each individual
Persons of a dark colouration ('dark' being used in the accepted sense of dark eyes and hair)	62	441	7.1
Persons of a fair colouration	26	178	6.8

V. Age.

	Total number of individuals tested	Total number of bites received	Average number of bites received by each individual
Persons of 30 years and under	29	194	6.6
Persons of more than 30, and less than 40	36	277	7.6
Persons of more than 40	23	148	6.4

VI. Nationality.

	Total number of individuals tested	Total number of bites received	Average number of bites received by each individual
Persons of British, Canadian or American extraction ...	57	352	6.1
Persons of Portuguese extraction	23	193	8.3
Persons of Brazilian extraction	6	59	9.8
Persons of Chinese extraction	1	7	7.0
Persons of African native extraction	1	8	8.0

Local Reaction. It was found impossible to record this in figures for lack of standard comparisons, but the impression of all observers during the experiment was that, as a class, the new-comers reacted most, the long-resident Europeans less and the native Brazilians least; in the case of the last named, as a rule, no reaction whatsoever could be detected.

SUMMARY

Before any conclusions can be drawn from these figures, two fallacies must be considered:—

(1) To obtain true results each of the sixteen experiments should be considered on its own merits, but this would demand too much space; as, however, it was arranged that as far as possible at each experiment approximately the same proportion of variable factors (*i.e.*, hairiness, nationality, etc.) should be present, and as the proportion of sweating to non-sweating individuals remained nearly constant, it appeared legitimate to add together the number of bites received in the sixteen experiments.

(2) The number of individuals tested and the number of bites recorded are so small that no definite conclusions can be drawn; they merely *suggest* what follows:—

Eighty-eight male persons of various nationalities and ages were tested with regard to their susceptibility to the bites of *Stegomyia calopus*. Six hundred and nineteen bites were received in all. The following factors were recorded:—

(1) Length of residence in Brazil; (2) sweating of surfaces exposed to bites; (3) hairiness of skin exposed to bites; (4) colouration; (5) age; (6) nationality.

The resulting figures would seem to show that none of these factors exert any marked influence on the number of bites received by the individual.

The theory that the number of mosquito bites received by the new-comer is greater than those received by the old resident, both being greater than those received by the native of the country, would appear to be, in part at any rate, attributable to the local reaction immunity displayed by the native, and to a less extent by the old resident.

I am indebted to Dr. H. W. Thomas for much help and suggestion.

REFERENCE

MARCHOUX, SALIMBENI, and SIMOND (1903). *Annales de l'Institut Pasteur*. Vol. XVII, p. 694.